

**Listing of Claims:**

Claim 1 (original): A system for sub-ambient pressure control for column head pressure in a gas chromatography (GC) system, comprising:

an inlet including:

a valve that regulates an inlet pressure; and

a pressure sensor that measures the inlet pressure and outputs a signal that indicates a measured inlet pressure, wherein the inlet includes an inlet-pressure set-point that can be set to a negative pressure set-point representing a pressure below ambient pressure, the negative pressure set-point driving the valve to change the inlet pressure until the measured inlet pressure equals the negative pressure set-point; and a capillary column connected to the inlet.

Claim 2 (original): The system of claim 1, further comprising:

a mass spectrometer (MS) connected to the capillary column.

Claim 3 (original): The system of claim 1, wherein the inlet further includes:

an electronic pressure controller that drives the valve in response to the inlet-pressure set-point and the measured inlet pressure.

Claim 4 (original): The system of claim 1, wherein the pressure sensor is a gauge pressure sensor.

Claim 5 (original): The system of claim 1, wherein the GC includes instructions on a computer-readable medium for:

setting the inlet-pressure set-point to a negative pressure set-point; and

driving the valve to change the inlet pressure until the measured inlet pressure equals the negative pressure set-point.

Claim 6 (original): The system of claim 1, wherein the inlet includes an error amplifier that receives the measured inlet pressure signal and an inlet-pressure set-point signal and outputs a decreasing drive to the valve when the inlet-pressure set-point signal is less than the measured inlet pressure signal.

Claim 7 (original): The system of claim 6, wherein the error amplifier outputs an increasing drive to the valve that causes the valve to increase the inlet pressure.

Claim 8 (original): The system of claim 2, wherein the MS includes a vacuum pump connected to the capillary column.

Claim 9 (original): The system of claim 1, wherein the inlet further includes:

- a septum purge; and

- a cap on the septum purge.

Claim 10 (original): The system of claim 1, further comprising:

- a computer, connected to the GC, including:

  - a processor; and

  - a memory that includes instructions executed by the processor for:

    - setting the inlet-pressure set-point to a negative pressure set-point; and

    - causing the valve to change the inlet pressure until the measured inlet pressure equals the negative pressure set-point.

Claim 11 (previously presented): A system for sub-ambient pressure control for column head pressure in a gas chromatography (GC) system, comprising:

- an inlet including:

  - a valve that regulates an inlet pressure; and

  - a pressure sensor that measures the inlet pressure and outputs a signal that indicates a measured inlet pressure, wherein the inlet includes an inlet-pressure set-point that can be set to a negative pressure set-point representing a pressure below ambient pressure, the negative pressure set-point driving the valve to change the inlet pressure until the measured inlet pressure equals the negative pressure set-point and wherein the gauge pressure sensor includes an offset ( $v_o$ ) so that a measured inlet pressure of zero (0psig) causes the gauge pressure sensor to output a positive measured inlet pressure voltage ( $v_o$ , where  $v_o > 0$ volts); and

  - a capillary column connected to the inlet.

Claim 12 (previously presented): The system of claim 11, wherein the offset is 1 volt ( $v_o = 1$  volt).

Claim 13 (previously presented): The system of claim 11, wherein the offset is large enough to avoid the gauge pressure sensor inadvertently outputting a negative measured inlet pressure voltage.

Claim 14 (original): A method for sub-ambient pressure control for column head pressure in a gas chromatography (GC) system comprising:

receiving a desired negative pressure set-point representing a pressure below ambient pressure; and

setting an inlet pressure set-point to the desired negative pressure set-point, wherein the desired negative pressure set-point indicates a desired negative inlet pressure for an inlet of the GC.

Claim 15 (original): The method of claim 14, further comprising:

reading a measured inlet pressure, wherein the measured inlet pressure is measured by a gauge pressure sensor in an inlet of the GC;

comparing the measured inlet pressure to the inlet pressure set-point;

determining if the measured inlet pressure is greater than the inlet pressure set-point; and

if the measured inlet pressure is greater than the inlet pressure set-point, decreasing the inlet pressure until the inlet pressure is a negative pressure matching the inlet pressure set-point.

Claim 16 (original): The method of claim 14, further comprising:

if the measured inlet pressure is less than the inlet pressure set-point, increasing the inlet pressure until the inlet pressure is a negative pressure matching the inlet pressure set-point.

Claim 17 (original): The method of claim 15, wherein the decreasing step includes causing a proportional valve in the inlet of the GC to decrease the inlet pressure.

Claim 18 (previously presented): A method for sub-ambient pressure control for column head pressure in a gas chromatography (GC) system comprising:

receiving a desired negative pressure set-point representing a pressure below ambient pressure;

setting an inlet pressure set-point to the desired negative pressure set-point, wherein the desired negative pressure set-point indicates a desired negative inlet pressure for an inlet of the GC; and

setting a gauge pressure sensor offset ( $v_o$ ) so that a measured inlet pressure of zero (0psig) causes a gauge pressure sensor to output a positive measured inlet pressure voltage ( $v_o$ , where  $v_o > 0$ volts).

Claim 19 (previously presented): A computer-readable medium comprising instructions for providing sub-ambient pressure control for column head pressure in a gas chromatography (GC) system by:

receiving a desired negative pressure set-point representing a pressure below ambient pressure; and

setting an inlet pressure set-point to the desired negative pressure set-point, wherein the desired negative pressure set-point indicates a desired negative inlet pressure for an inlet of the GC.

Claim 20 (original): The computer-readable medium of claim 19, further comprising instructions for:

reading a measured inlet pressure, wherein the measured inlet pressure is measured by a gauge pressure sensor in an inlet of the GC;

comparing the measured inlet pressure to the inlet pressure set-point;

determining if the measured inlet pressure is greater than the inlet pressure set-point;

and

if the measured inlet pressure is greater than the inlet pressure set-point, decreasing the inlet pressure until the inlet pressure is a negative pressure matching the inlet pressure set-point.